

# (12) UK Patent Application (19) GB (11) 2 289 057 (13) A

(43) Date of Printing by UK Office 08.11.1995

(21) Application No 9512305.5

(22) Date of Filing 18.10.1994

(30) Priority Data

(31) 02260247 (32) 18.10.1993 (33) JP

(86) International Application Data

PCT/JP94/01752 Jp 18.10.1994

(87) International Publication Data

WO95/11320 Jp 27.04.1995

(71) Applicant(s)

Nippon Steel Corporation

(Incorporated in Japan)

6-3 Otomachi 2-chome, Chiyoda-ku, Tokyo 100-71,  
Japan

(71), (72) and (74) continued overleaf

(51) INT CL<sup>6</sup>

C22C 38/14 , C21D 8/02 9/46 , C22C 33/04

(52) UK CL (Edition N )

C7A AA249 AA25Y AA276 AA279 AA28X AA28Y  
AA30Y AA326 AA329 AA339 AA349 AA35Y AA366  
AA389 AA37Y AA385 AA387 AA409 AA439 AA459  
AA48Y AA505 AA507 AA51Y AA523 AA525 AA527  
AA529 AA53Y AA541 AA543 AA545 AA547 AA549  
AA55Y AA574 AA577 AA579 AA58Y AA595 AA599  
AA60Y AA605 AA607 AA61Y AA623 AA625 AA627  
AA629 AA67X AA670 AA671 AA673 AA675 AA677  
AA679 AA68X AA681 AA683 AA685 AA687 AA688  
AA689 AA69X AA693 AA695 AA696 AA697 AA698  
AA699 AA70X A746 A748 A751 A752 A77Y A78Y A78Z  
A783

(56) Documents Cited by ISA

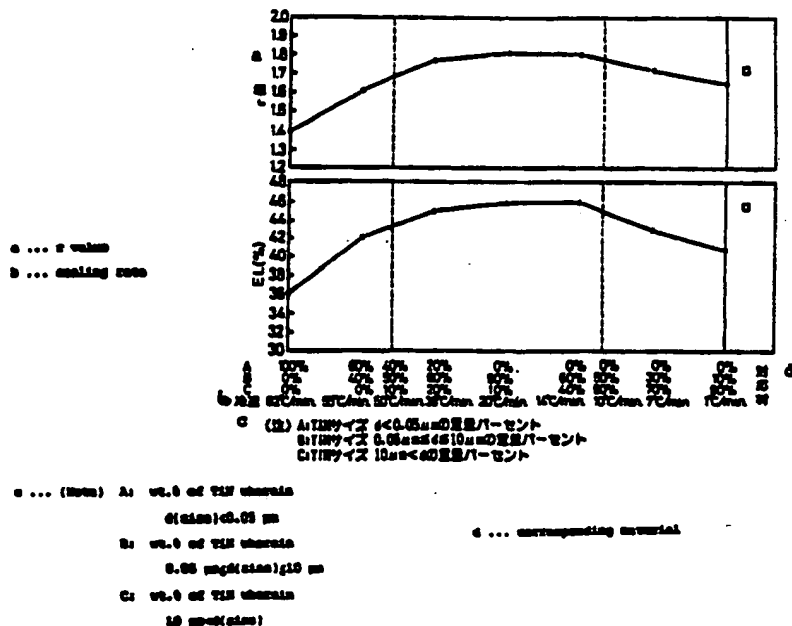
JP 630045322 A JP 003267321 A

(58) Field of Search by ISA

INT CL<sup>5</sup> C21D 8/00 8/02 8/04 9/46 9/48 , C22C

(54) Cold-rolled steel sheet having excellent workability and process for producing the same

(57) A cold-rolled steel sheet having excellent cold workability in spite of its having a high nitrogen content for the purpose or recycling scrap iron. The sheet contains at most 0.1 % of carbon, 60 - 150 ppm of nitrogen, at most 0.4 % of manganese, at most 0.030 % of sulfur (provided Mn/S  $\geq 7$ ), at most 0.1 % of aluminum and at most 0.08 % of titanium (provided N (%) - Ti/3.42 (%)  $\leq 0.007$ ), and at least one half by weight of TiN which is a size of 0.05 - 10  $\mu\text{m}$ . When it is produced through continuous annealing, the condition of N (%) - Ti/3.42 (%)  $\leq 0.004$  % must be satisfied and it is further necessary to conduct high-temperature winding in the hot rolling step or to add boron. When it is produced through box annealing, the condition of 0.002 %  $\leq$  N (%) - Ti/3.42 (%)  $\leq 0.007$  % must be satisfied and it is further necessary to somewhat raise the slab heating temperature in the hot rolling step and lower the winding temperature in this step.



GB 2 289 057

(71) cont

**Japan Casting & Forging Corporation**

**(Incorporated in Japan)**

**7-15 Kudanminami 4-chome, Chiyoda-ku, Tokyo 102, Japan**

(72) Inventor(s)

**Hisayoshi Yatoh**

**Yasuhiko Yamashita**

**Takashi Harabuchi**

**Seinosuke Yano**

(74) Agent and/or Address for Service

**Reddie & Grosse**

**18 Theobalds Road, LONDON, WC1X 8PL,**

**United Kingdom**